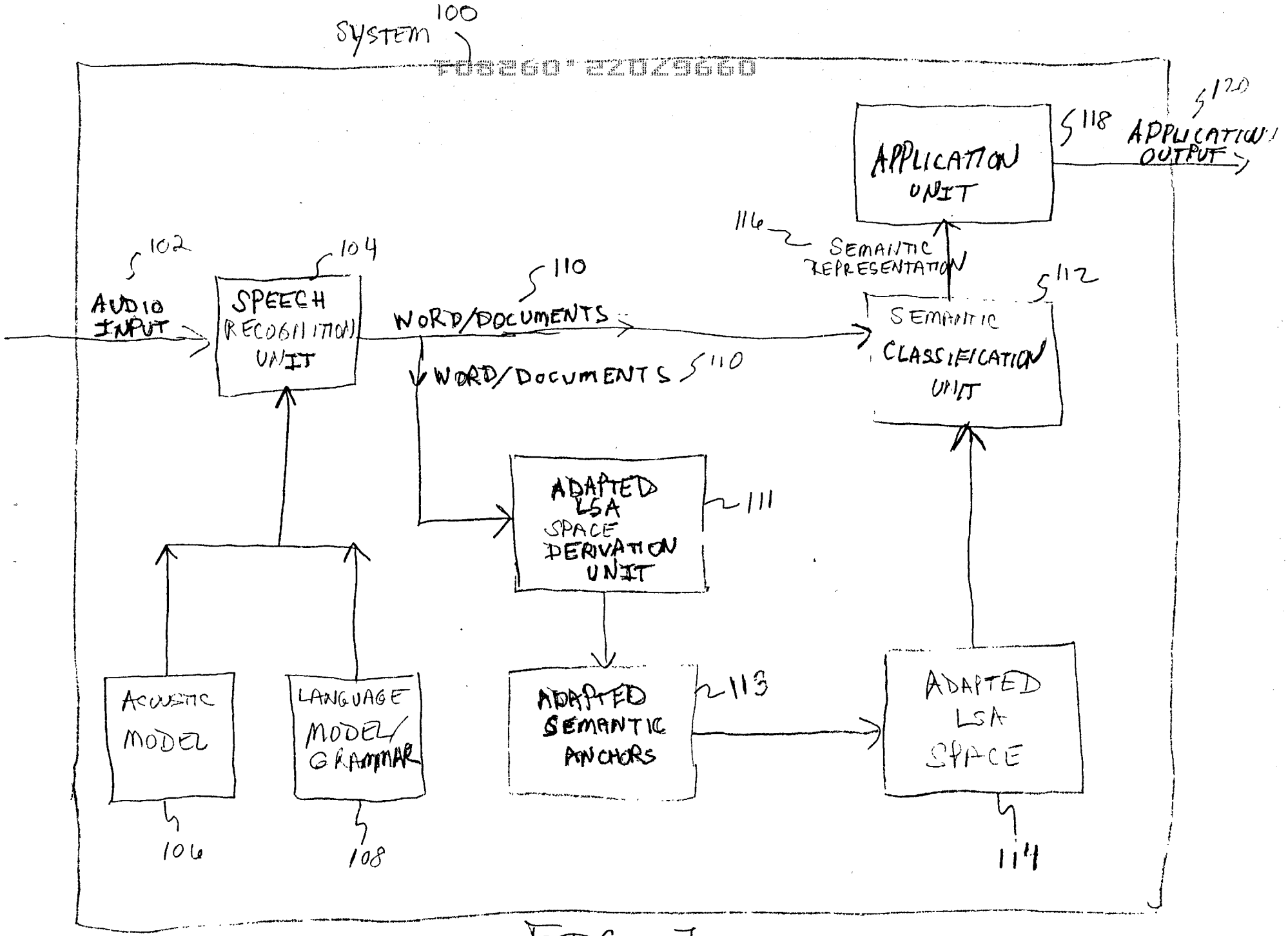

SYSTEM
100
AUDIO INPUT
102
SPEECH RECOGNITION UNIT
104
WORD/DOCUMENTS
110
WORD/DOCUMENTS
110
APPLICATION UNIT
118
APPLICATION OUTPUT
120
SEMANTIC REPRESENTATION
116
SEMANTIC CLASSIFICATION UNIT
112
ADAPTED LSA SPACE DERIVATION UNIT
111
ACOUSTIC MODEL
106
LANGUAGE MODEL/ GRAMMAR
108
ADAPTED SEMANTIC ANCHORS
113
ADAPTED LSA SPACE
114

FIG. 1

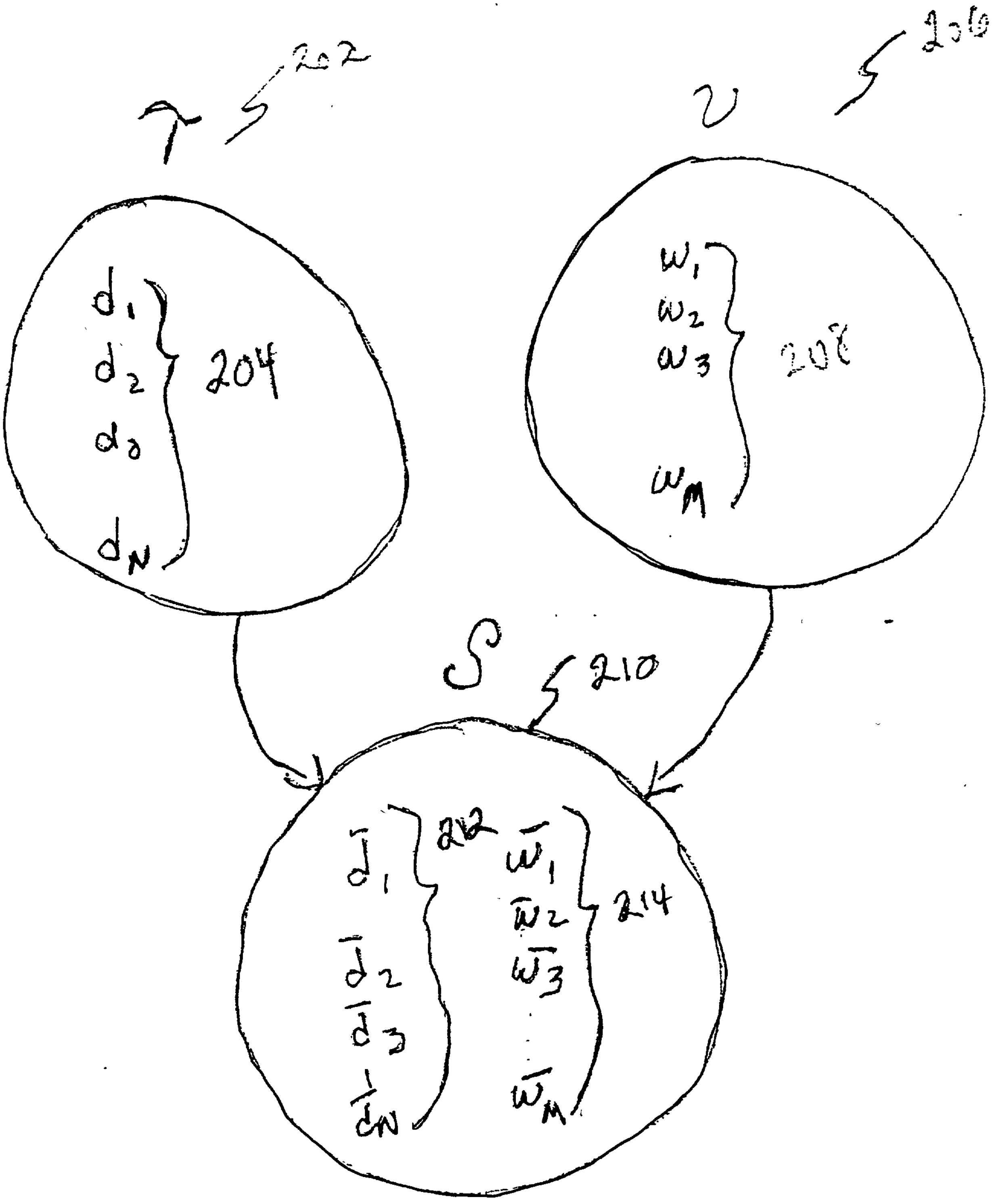
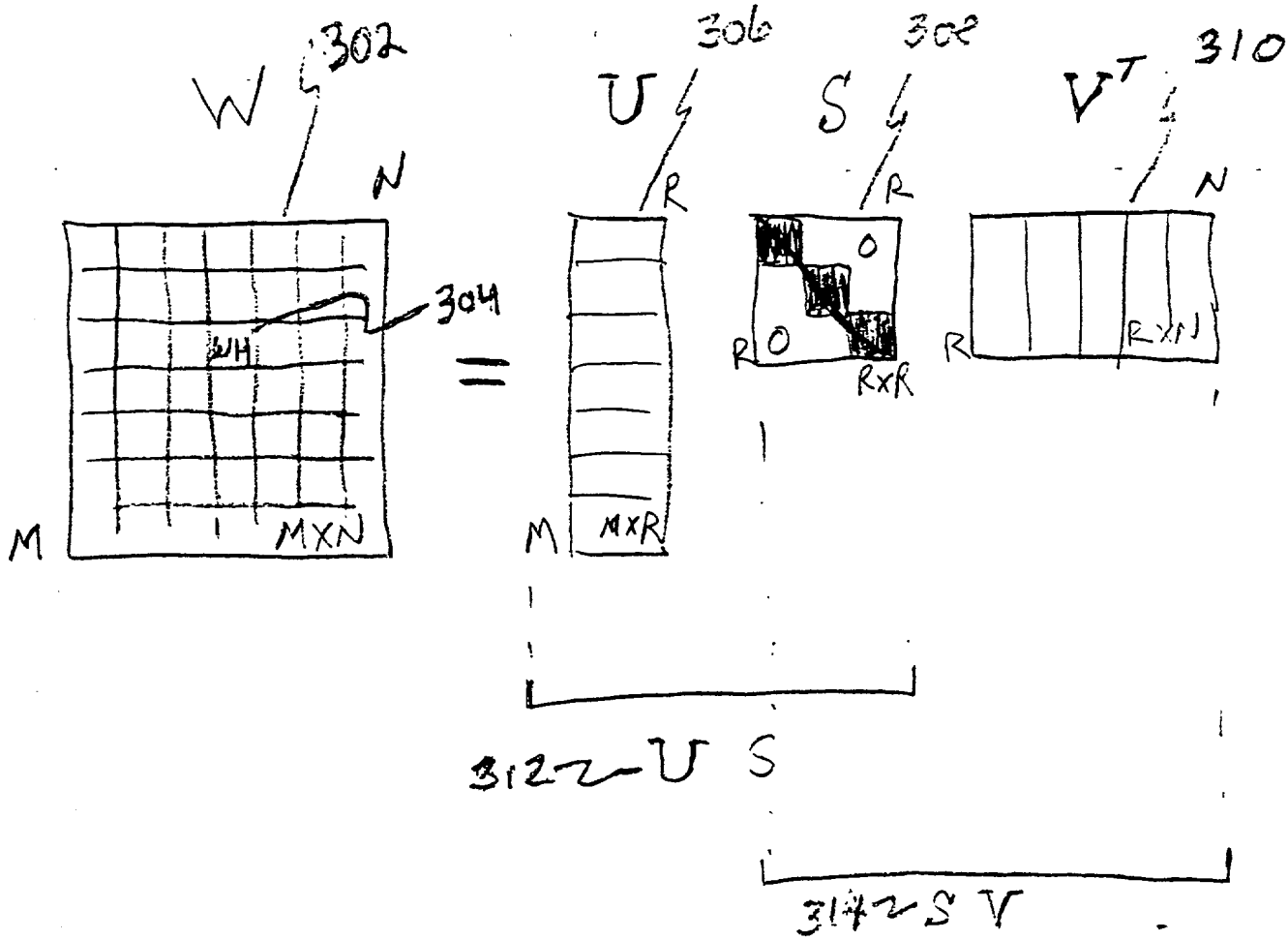


FIG. 2


W
302
N
304
M
MXN
=
U
306
R
M
MXR
S
302
R
O
R
O
RxR
V^T
310
N
R
RXN
312 U S
314 S V

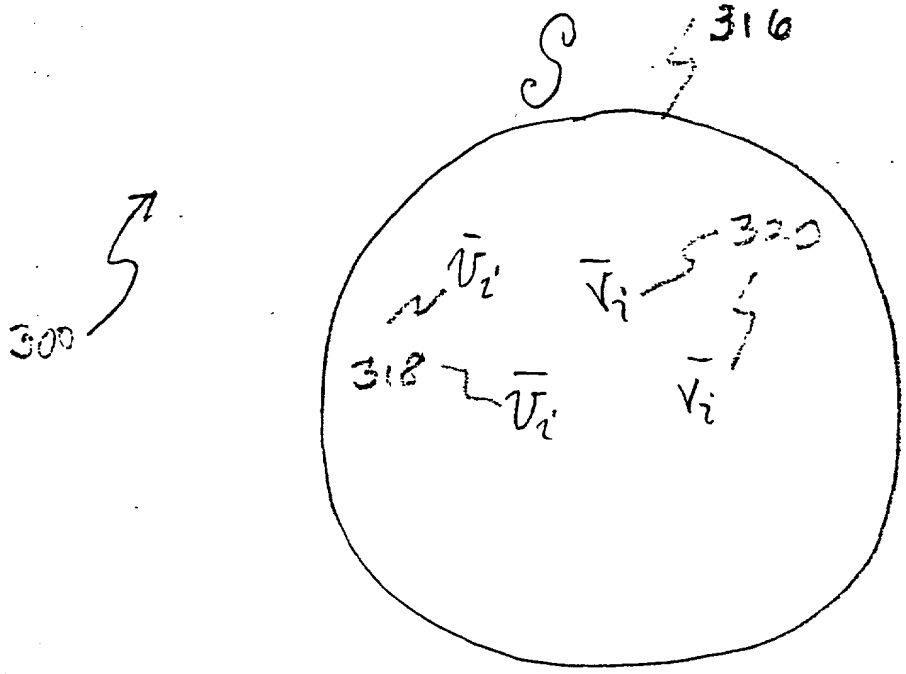

S
316
300
318
320

FIG. 3

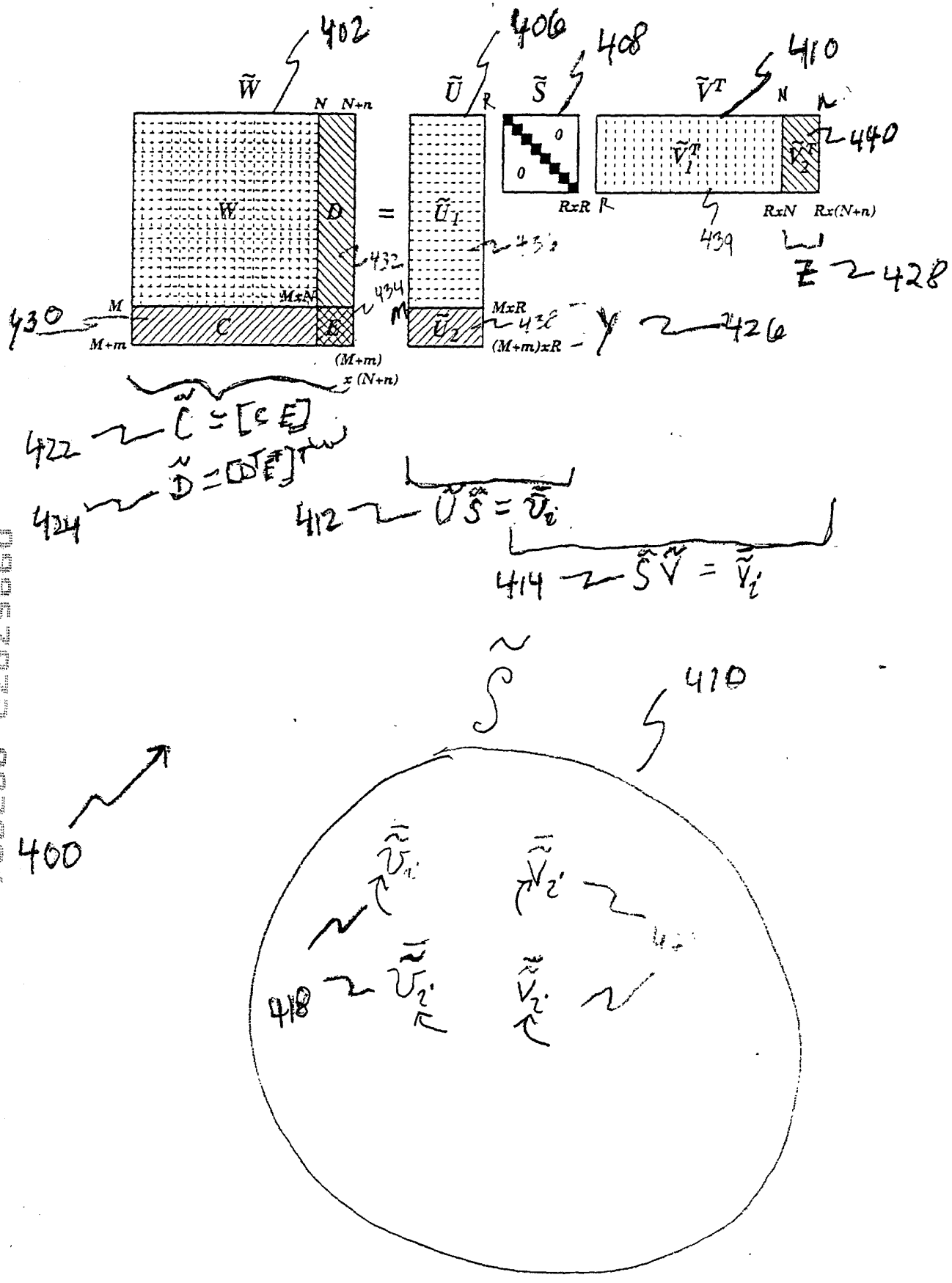

402
406
408
410
$\tilde{W}$
$\tilde{U}$
$\tilde{S}$
$\tilde{V}^T$
N
N+n
R
RxR
RxN
Rx(N+n)
W
D
C
E
$\tilde{U}_1$
$\tilde{U}_2$
$\tilde{V}_1^T$
$\tilde{V}_2^T$
=
M
M+m
MxN
MxR
(M+m)xR
(M+m) x (N+n)
430
432
434
436
438
439
440
426
428
422
424
412
414
$\tilde{C} = [C\ E]$
$\tilde{D} = [D\ F]$
$\tilde{U}\tilde{S} = \tilde{U}_i$
$\tilde{S}\tilde{V} = \tilde{V}_i$
400
418

FIG. 4

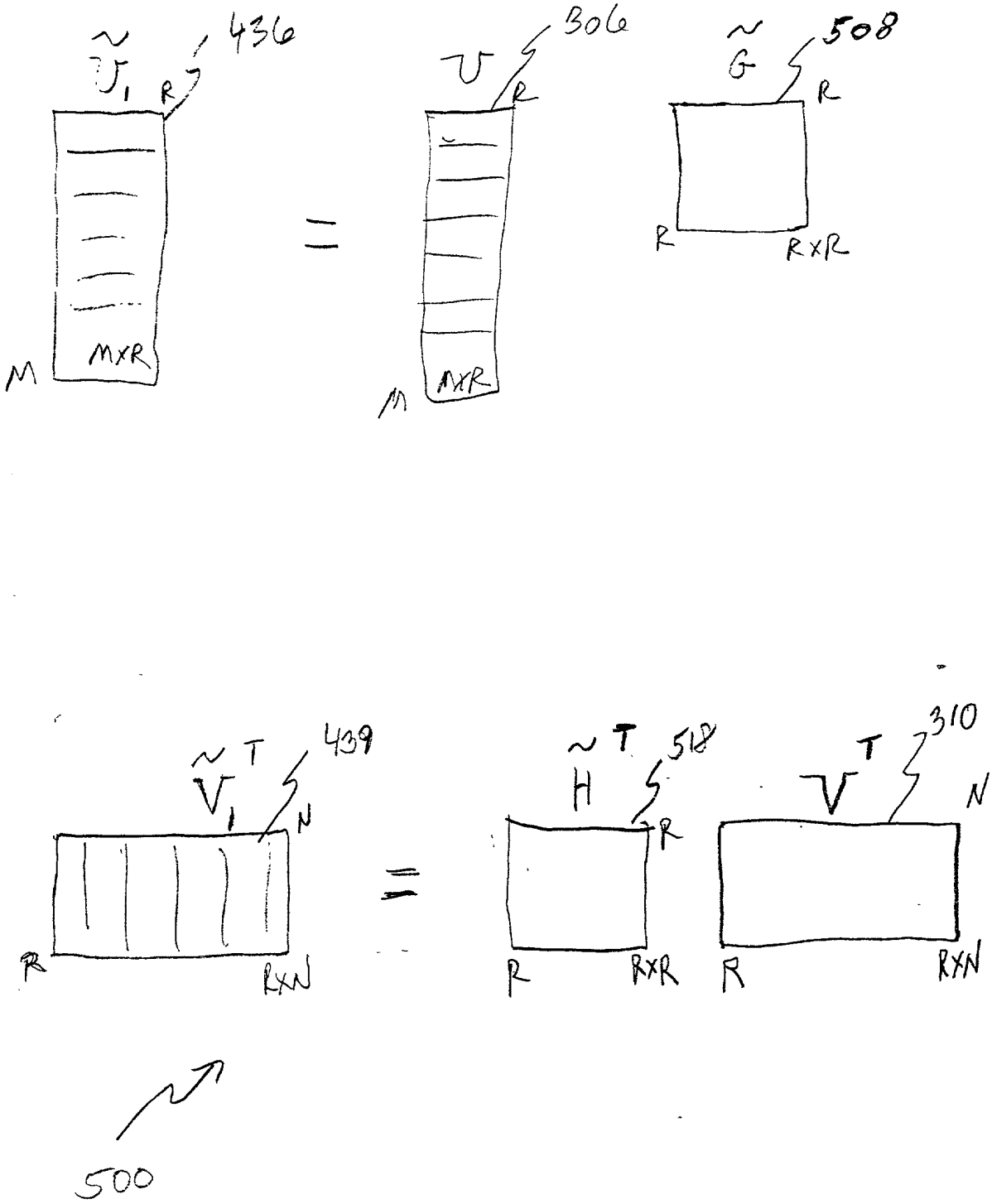

$\tilde{J}_1$
R
436
M
MXR
=
U
R
306
M
MXR
$\tilde{G}$
508
R
R
RXR
$\tilde{V}_1$
T
439
N
R
RXN
=
$\tilde{H}$
T
518
R
R
RXR
V
T
310
N
R
RXN
500

FIG. 5

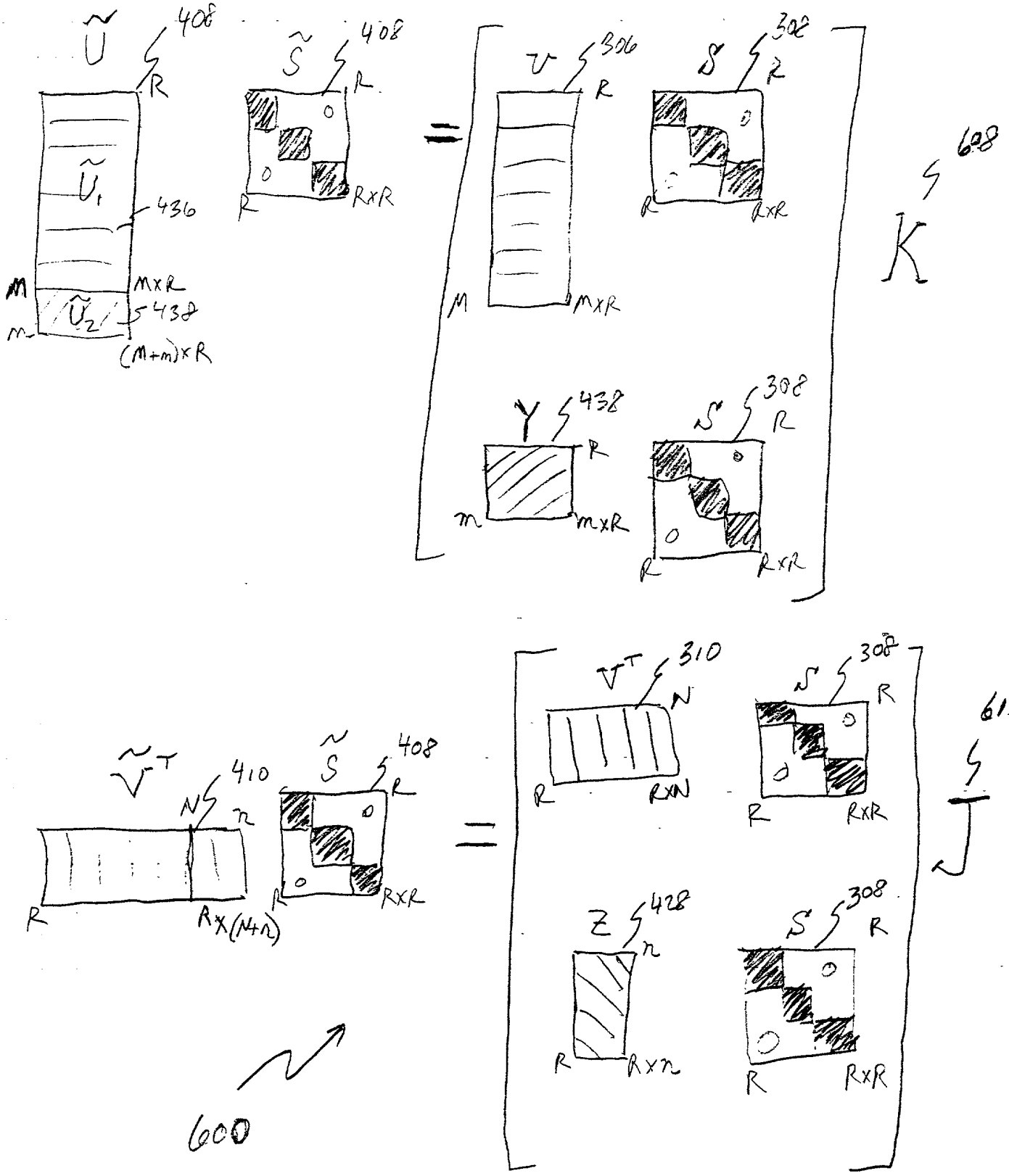

$\tilde{U}$
408
R
$\tilde{U}_1$
436
M
MxR
$\tilde{U}_2$
438
m
(M+m)xR
$\tilde{S}$
408
R
R
RxR
=
V
306
R
M
MxR
S
302
R
R
RxR
K
608
Y
438
R
m
mxR
S
308
R
R
RxR
$\tilde{V}^T$
410
N
n
R
Rx(N+n)
$\tilde{S}$
408
R
R
RxR
=
V^T
310
N
R
RxN
S
308
R
R
RxR
J
618
Z
428
n
R
Rxn
S
308
R
R
RxR
600

FIG. 6

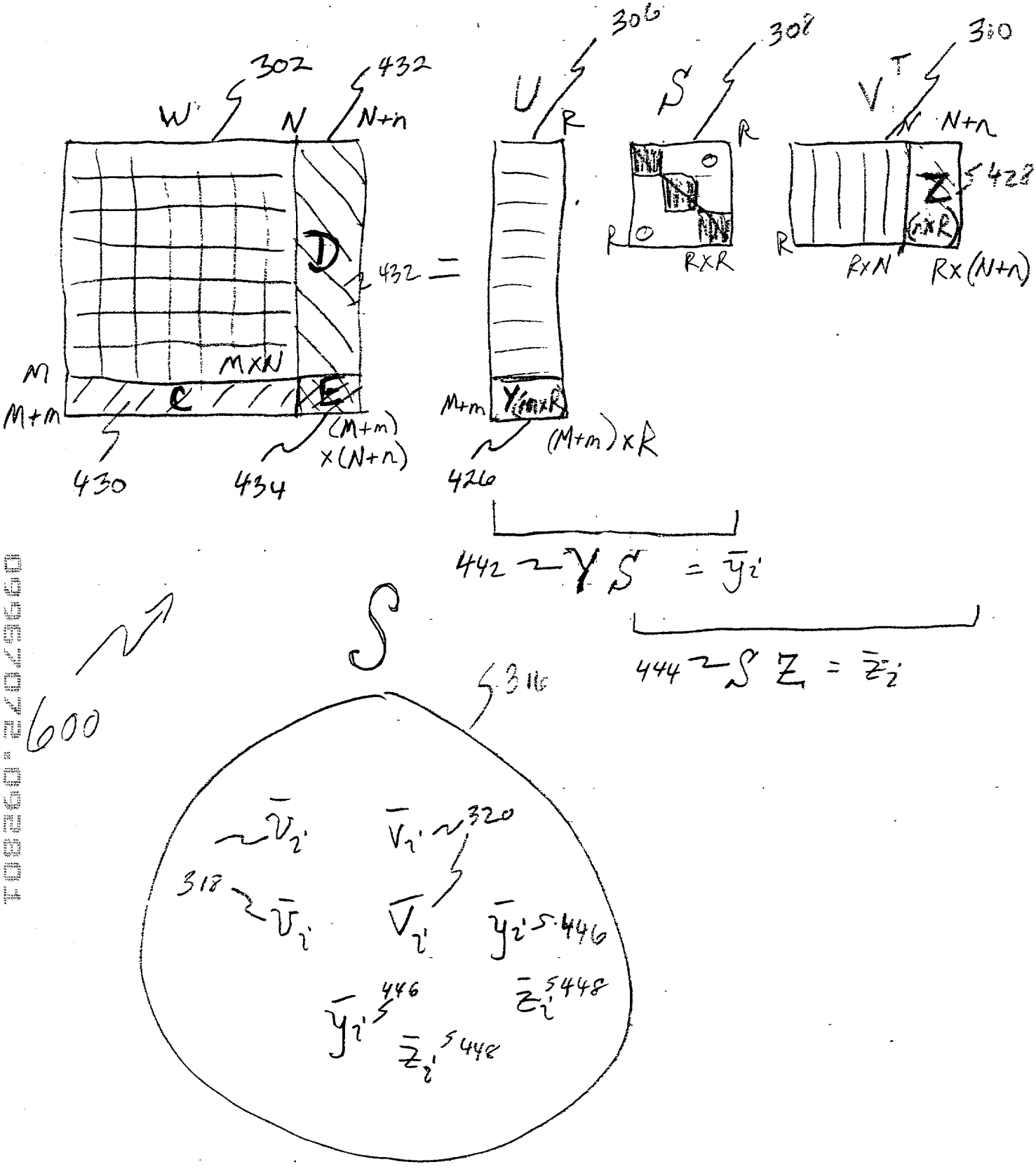


FIG. 7 (PRIOR ART)

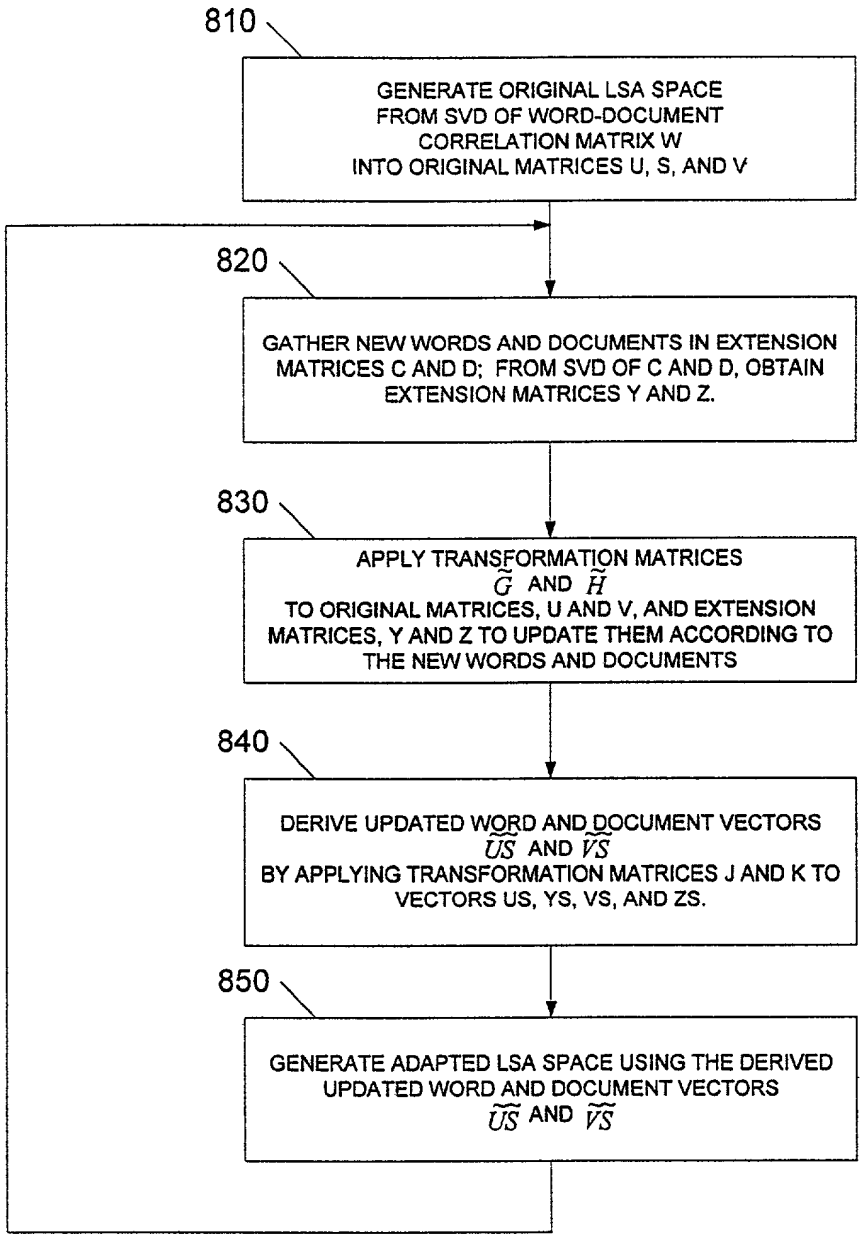

810
GENERATE ORIGINAL LSA SPACE FROM SVD OF WORD-DOCUMENT CORRELATION MATRIX W INTO ORIGINAL MATRICES U, S, AND V
820
GATHER NEW WORDS AND DOCUMENTS IN EXTENSION MATRICES C AND D; FROM SVD OF C AND D, OBTAIN EXTENSION MATRICES Y AND Z.
830
APPLY TRANSFORMATION MATRICES $\widetilde{G}$ AND $\widetilde{H}$ TO ORIGINAL MATRICES, U AND V, AND EXTENSION MATRICES, Y AND Z TO UPDATE THEM ACCORDING TO THE NEW WORDS AND DOCUMENTS
840
DERIVE UPDATED WORD AND DOCUMENT VECTORS $\widetilde{US}$ AND $\widetilde{VS}$ BY APPLYING TRANSFORMATION MATRICES J AND K TO VECTORS US, YS, VS, AND ZS.
850
GENERATE ADAPTED LSA SPACE USING THE DERIVED UPDATED WORD AND DOCUMENT VECTORS $\widetilde{US}$ AND $\widetilde{VS}$

FIG. 8

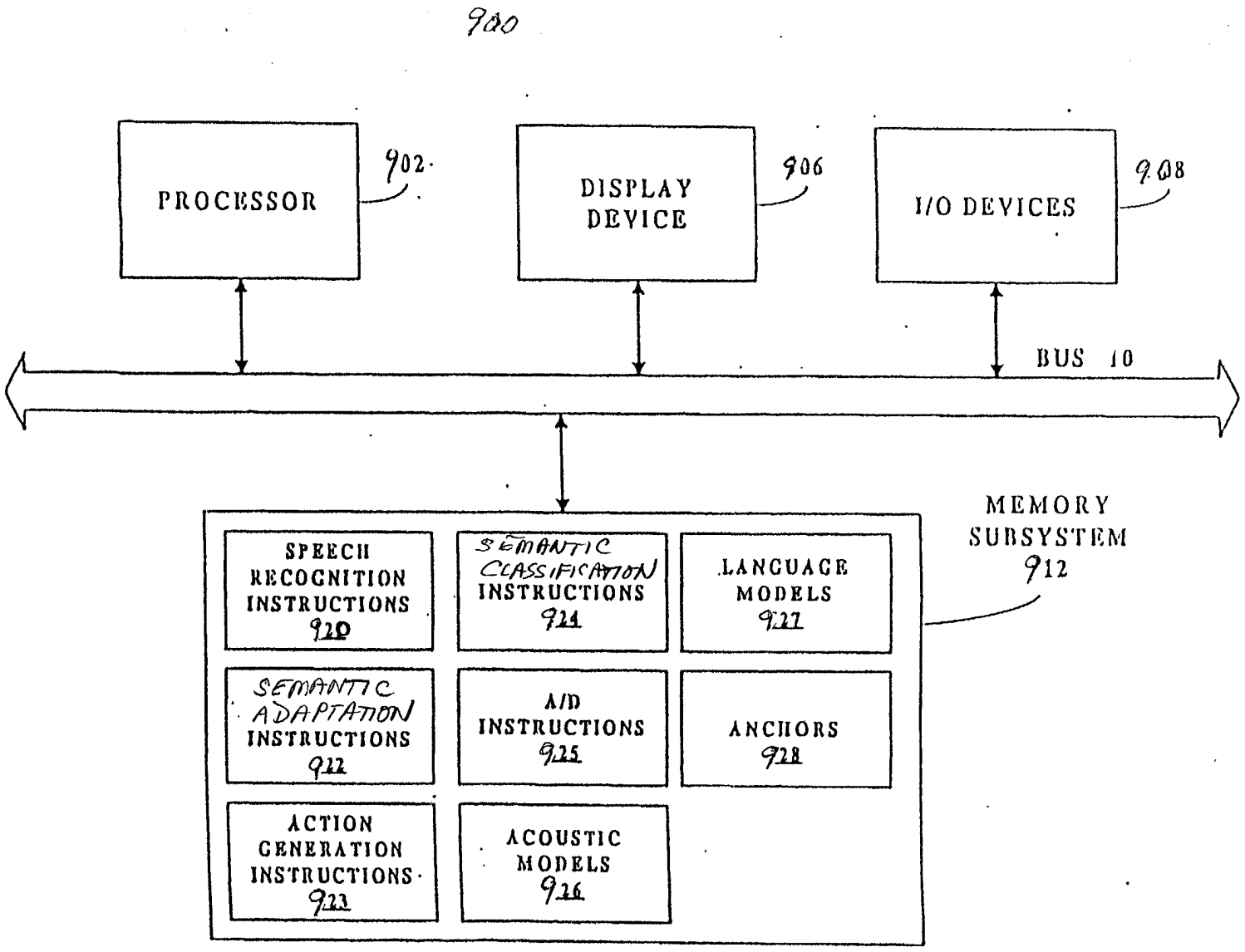


FIG. 9

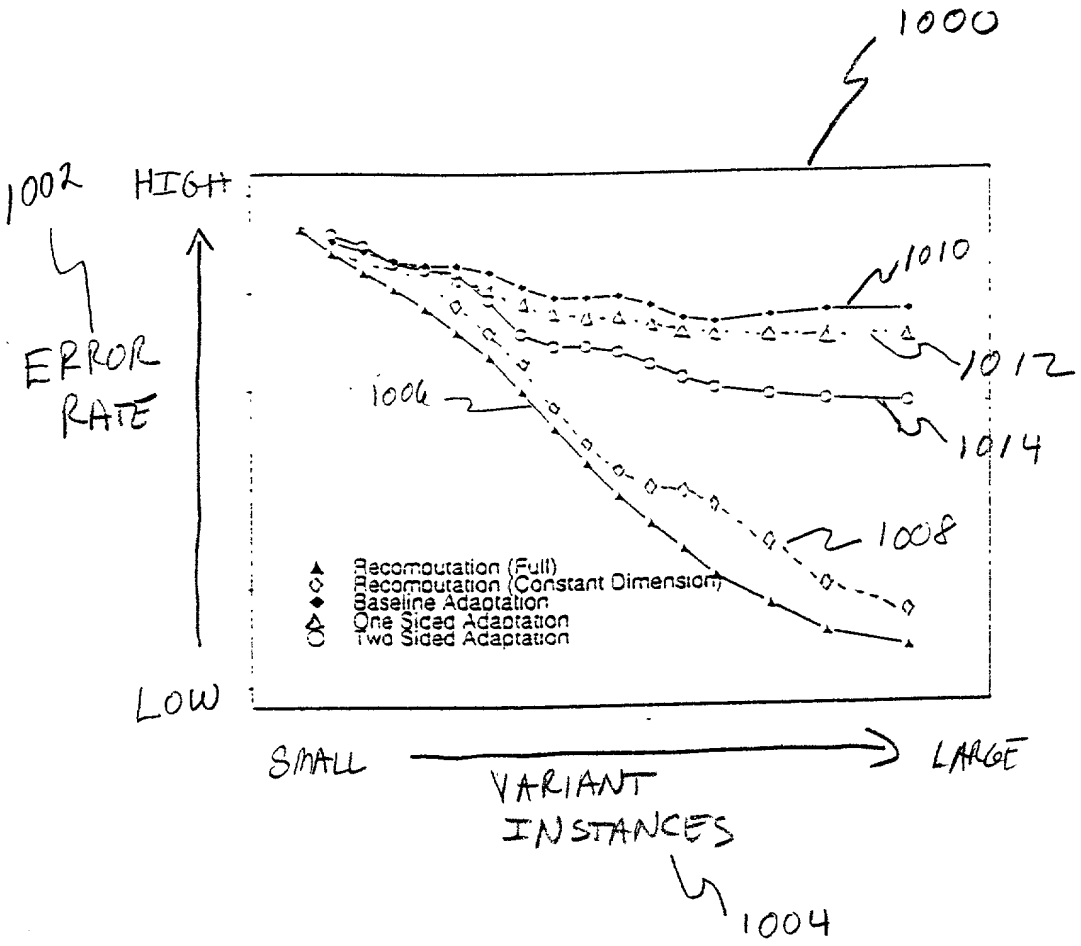

1000
1002
HIGH
ERROR RATE
LOW
1010
1012
1006
1014
1008
Recomputation (Full)
Recomputation (Constant Dimension)
Baseline Adaptation
One Sided Adaptation
Two Sided Adaptation
SMALL
LARGE
VARIANT INSTANCES
1004

FIG. 10